



# achievement TESTING program

## Information Bulletin

• Grade 9 Mathematics •

**2000 – 2001 School Year**

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# **Grade 9 Mathematics Assessment**

## **General Description**

The Grade 9 Mathematics Achievement Test consists of two sections:

- one section has 44 multiple-choice questions, each worth one mark
- the other section has six numerical-response questions, each worth one mark

The sections may be done in whatever order the student chooses.

The questions are integrated in narrative themes.

The test is developed to be completed in 90 minutes; however, students may take an additional 30 minutes to complete the test.

Students record their answers on a separate machine-scorable answer sheet.

Students will require a scientific calculator, HB pencils, a ruler, and an eraser. See the link for the *Use of Calculators on Alberta Learning Achievement Tests*.

Students may also use manipulative materials when completing the test.

## **Reporting Categories**

The following indicators briefly highlight the learnings related to the two reporting categories of knowledge and skills.

### **Knowledge**

- recalls facts, concepts, and terminology
- knows procedures for algorithms and computations, and for using formulas
- knows procedures for constructions, measurements, conversions, and order of operations
- knows mental computation and estimation strategies
- knows how to use calculators and computers

### **Skills**

- applies basic mathematical concepts in familiar and unfamiliar situations
- demonstrates relationships among number systems, operations, number forms (fractions, decimals, powers, etc.), and concrete, pictorial, and symbolic representations
- demonstrates and applies relationships within equations and formulas
- demonstrates and applies relationships among geometric forms in a variety of situations
- demonstrates relationships between numbers and geometric forms
- uses a variety of strategies to solve problems
- applies data management skills to solve problems
- judges the reasonableness of a solution



## Description of Mathematics Assessment Standards

The following statements describe what is expected of Grade 9 students who are meeting the *acceptable standard* or the *standard of excellence*, based on outcomes in the *Program of Studies*. These statements represent the standards against which student achievement is measured. It is important to remember that one test cannot measure all of the outcomes in the *Program of Studies*.

<i>Acceptable Standard</i>	<i>Standard of Excellence</i>
<p>Students who meet the <i>acceptable standard</i> in Grade 9 Mathematics have a basic understanding of mathematical concepts, related procedures, and problem-solving applications. They can demonstrate understanding in concrete, pictorial, and symbolic modes, and translate from one mode to another. For example, students meeting the <i>acceptable standard</i> know that the solution to the equation <math>4(x + \frac{1}{2}) = -3</math> is <math>x = -\frac{5}{4}</math> and are able to demonstrate their understanding by explaining how this solution can be determined and what it means for the solution to be <math>-\frac{5}{4}</math>. They are able to communicate and verify the solution in any of the three modes.</p> <p>Students who meet the <i>acceptable standard</i> are able to explore problems and describe results using graphical, numerical, physical, algebraic, and verbal mathematical models of representation.</p> <p>Students meeting the <i>acceptable standard</i> perform the mathematical operations and procedures that are fundamental to mathematics in Grade 9 and apply what they know to solving straightforward problems in familiar settings. They are able to describe the steps they used to solve a particular problem, and they can verify and defend their solution to the problem.</p> <p>Students meeting the <i>acceptable standard</i> have a positive attitude about mathematics and a sense of personal competence in using mathematics. They demonstrate confidence when using common mathematical procedures and when applying problem-solving strategies in familiar settings.</p>	<p>Students who meet the <i>standard of excellence</i> in Grade 9 Mathematics have a superior understanding of mathematical concepts, related procedures, and applications in novel problem-solving situations. They are comfortable demonstrating their understandings in concrete, pictorial, or symbolic forms of representation. For example, they are able to show that a triangle maintains its shape and its size whenever it is reflected in either coordinate axis. In order to demonstrate this property, they can determine measurements by using the properties of congruent triangles and the length properties of segments on Cartesian grids. They are able to create and generalize problem situations to illustrate concepts and to analyze and explain relationships among concepts.</p> <p>Students who meet the <i>standard of excellence</i> are able to model mathematical situations clearly, using oral, written, concrete, pictorial, graphical, and algebraic methods. They are expected to understand mathematical questions presented with objects, diagrams, or symbols in both common and unusual contexts.</p> <p>Students meeting the <i>standard of excellence</i> perform the mathematical operations and procedures that are fundamental to mathematics in Grade 9 and apply mathematical thinking and modeling to solve and create non-routine problems. They are able to clearly describe the steps that they or other students have used to solve a particular problem, and they can suggest alternative procedures and/or solutions. They are able to generalize solutions and strategies to new problem situations.</p> <p>Students meeting the <i>standard of excellence</i> have a positive attitude toward mathematics and show confidence in using mathematics meaningfully. They are self-motivated risk-takers who persevere when solving novel problems. They take initiative in trying new methods and are creative in their approach to problem solving.</p>



## Blueprint

The blueprint for mathematics shows the reporting categories under which questions are classified. The number of questions in each category is approximate.

General Outcomes*	Knowledge	Skills	Number and Proportion of Questions
<b>Number</b> <ul style="list-style-type: none"> <li>Explain and illustrate the structure and the interrelationship of the sets of numbers within the rational number system</li> <li>Develop a number sense of powers with integral exponents and rational bases</li> <li>Use a scientific calculator or a computer to solve problems involving rational numbers</li> <li>Explain how exponents can be used to bring meaning to large and small numbers, and use calculators or computers to perform calculations involving these numbers</li> </ul>	4	9	13 (26%)
<b>Patterns and Relations</b> <ul style="list-style-type: none"> <li>Generalize, design, and justify mathematical procedures, using appropriate patterns, models, and technology</li> <li>Solve and verify linear equations and inequalities in one variable</li> <li>Generalize arithmetic operations from the set of rational numbers to the set of polynomials</li> </ul>	4	11	15 (30%)
<b>Shape and Space</b> <ul style="list-style-type: none"> <li>Use trigonometric ratios to solve problems involving a right triangle</li> <li>Describe the effects of dimension changes in related 2-D shapes and 3-D objects in solving problems involving area, perimeter, surface area, and volume</li> <li>Specify conditions under which triangles may be similar or congruent, and use these conditions to solve problems</li> <li>Use spatial problem solving in building, describing, and analyzing geometric shapes</li> <li>Apply coordinate geometry and pattern recognition to predict the effects of translations, rotations, reflections, and dilatations on 1-D lines and 2-D shapes</li> </ul>	5	9	14 (28%)
<b>Statistics and Probability</b> <ul style="list-style-type: none"> <li>Collect and analyze experimental results expressed in two variables, using technology, as required</li> <li>Explain the use of probability and statistics in the solution of complex problems</li> </ul>	3	5	8 (16%)
<b>Number and Proportion of Questions</b>	16 (32%)	34 (68%)	50 (100%)

\*From the *Alberta Program of Studies for K–9 Mathematics*, June 1996



## *Preparing Students for the Mathematics Test*

### *Suggestions for Preparing Students*

The best way to prepare students for writing the achievement tests is to teach the curriculum well and to ensure that children know what is expected. Many of the skills and attitudes that support test writing are, in fact, good skills and strategies for approaching all kinds of learning tasks.

Teachers are encouraged to familiarize their students with the types of questions that will appear on the test by discussing questions from achievement tests that are no longer secured. Then, have students share strategies they used to answer the questions.

Teachers are also encouraged to share the following information with their students to help them prepare for the Grade 9 Mathematics Achievement Test.

### *Suggestions for Answering Multiple-Choice Questions*

- Before you begin, find out
  - how much time you have
  - if you can use a calculator, tables, diagrams, manipulatives, etc.
- Ask questions if you are unsure of anything.
- Skim through the whole test before beginning. Find out how many questions there are and plan your time accordingly.
- Answer easier questions first, then go back to harder ones.
- Do not spend too much time on any one question. Make a mark (\* or ?) beside questions that you wish to go back to.

- Read each question carefully, underline key words, and try to think of an answer before looking at the choices.
- Read all of the choices and see which one best fits the answer.
- When you are not sure which answer is correct, cross out any choices that are wrong, then pick the choice that is best.
- If you don't know the right answer, guess. Answer all questions—there is no penalty for guessing.
- If time permits, recheck your answers.
- Double check to make sure you have answered everything before handing in the test.
- Note that the questions on the mathematics test are placed in real-life contexts and organized in narrative themes.
- Read the information given using the strategy that works best for you. You should either
  - look at all the information and think carefully about it before you try to answer the questions **OR**
  - read the questions first and then look at the information, keeping in mind the questions you need to answer
- Make sure you look at all forms of the information given. Information may be given in words, charts, pictures, graphs, or maps.
- When information is given for more than one question, go back to the information before answering each question.
- Check your work when you calculate an answer, even when your answer is one of the choices.

For further suggestions, see *Teaching Students with Learning Disabilities*, Alberta Learning, Special Programs Branch, pages LD 122 to 124.

**ALL of the 2000 achievement tests are secured. The 1998 and the 1999 achievement tests are no longer secured and are posted on the Alberta Learning web site <http://ednet.edc.gov.ab.ca>.**



## ***Learner Assessment Branch Contacts***

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